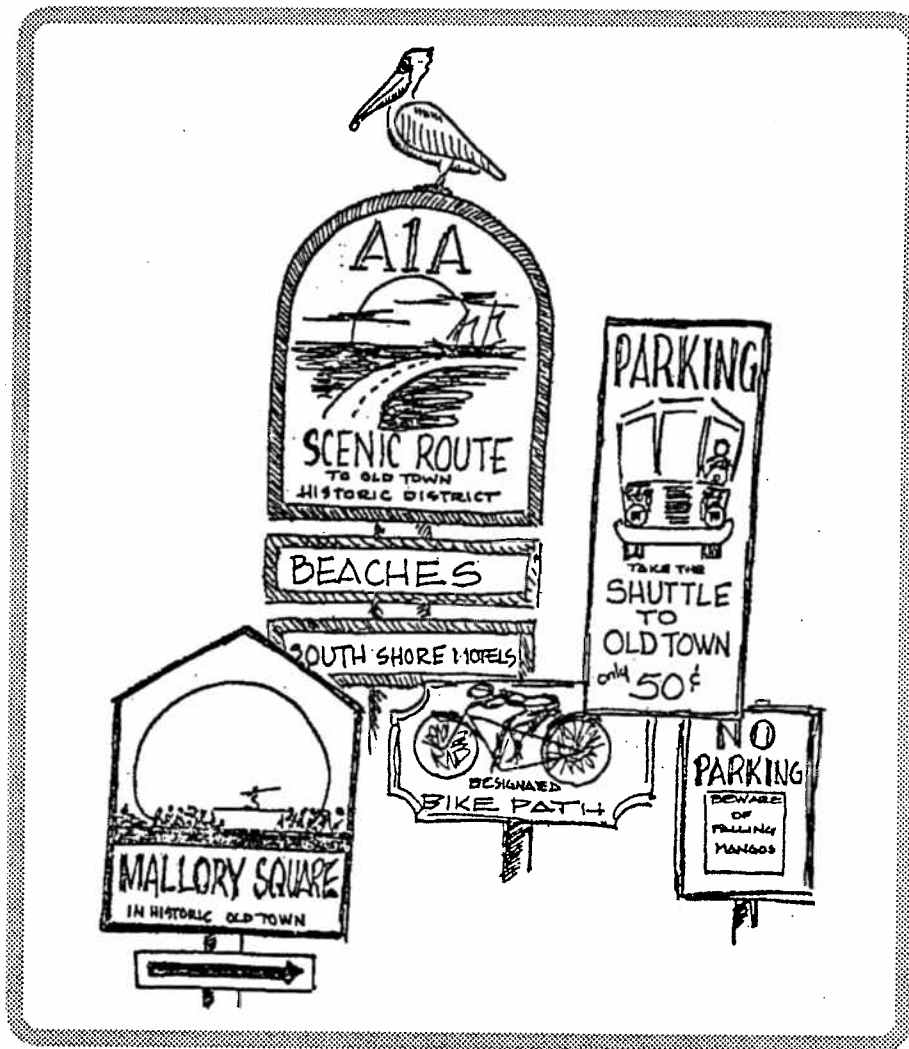


# KEY WEST

## TRAFFIC CIRCULATION STUDY

### TECHNICAL MEMORANDUM NO. 3



Prepared For  
CITY OF KEY WEST  
By The  
FLORIDA DEPARTMENT OF TRANSPORTATION

TECHNICAL MEMORANDUM NUMBER 3

Analysis of Initial Alternatives

Key West Traffic Circulation Study

Prepared For  
City of Key West

Prepared By  
Florida Department of Transportation  
March 1988

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## INTRODUCTION

The development of a traffic circulation plan for Key West will be an iterative process designed to allow maximum input from the traffic circulation committee. The analysis procedure used for the Key West Circulation Study will permit the consideration and testing of many alternatives. From the results of this testing a preferred plan will be developed and documented in Technical Memorandum Number 4.

Initial analysis was conducted on the existing road network. Future traffic, that traffic associated with buildout, was loaded onto the existing road network and capacity deficiencies were identified. These deficiencies are detailed in Technical Memorandum Number 2.

The capacity deficiencies identified in Technical Memorandum Number 2 were presented to the study advisory committee for their review. The study advisory committee's review led to the development of a number of system concepts. These concepts provided for improvements to major travel corridors which serve as access to the large trip attractors located within Key West.

The advisory committee was instructed to disregard costs, adverse impact to neighborhoods or the business community and physical constraints in the first iteration of concepts. The purpose here was to determine just how much improvement would be necessary to reduce the congestion to acceptable levels. The next iteration would be to determine which of these concepts would be acceptable to the citizens of Key West and which would not.

Based on discussions with the City of Key West planning staff, the system concepts developed by the study advisory committee were refined into five alternative plans. Assignments of buildout travel demands were made to each of the alternative plans. The analysis of the results of the assignment process are reported herein and are intended for use as a guide in the refinement of the alternatives into more realistic projects to be carried into the next iteration.

## ALTERNATIVE PLAN A1

Alternative Plan A1 is illustrated in Figure 1. This plan calls for a series of one-way streets connected in a manner as to form a loop, thus creating a circumferential route around Key West. This plan was developed in an attempt to provide relief to those roads in most distress while expending a minimum amount of funds.

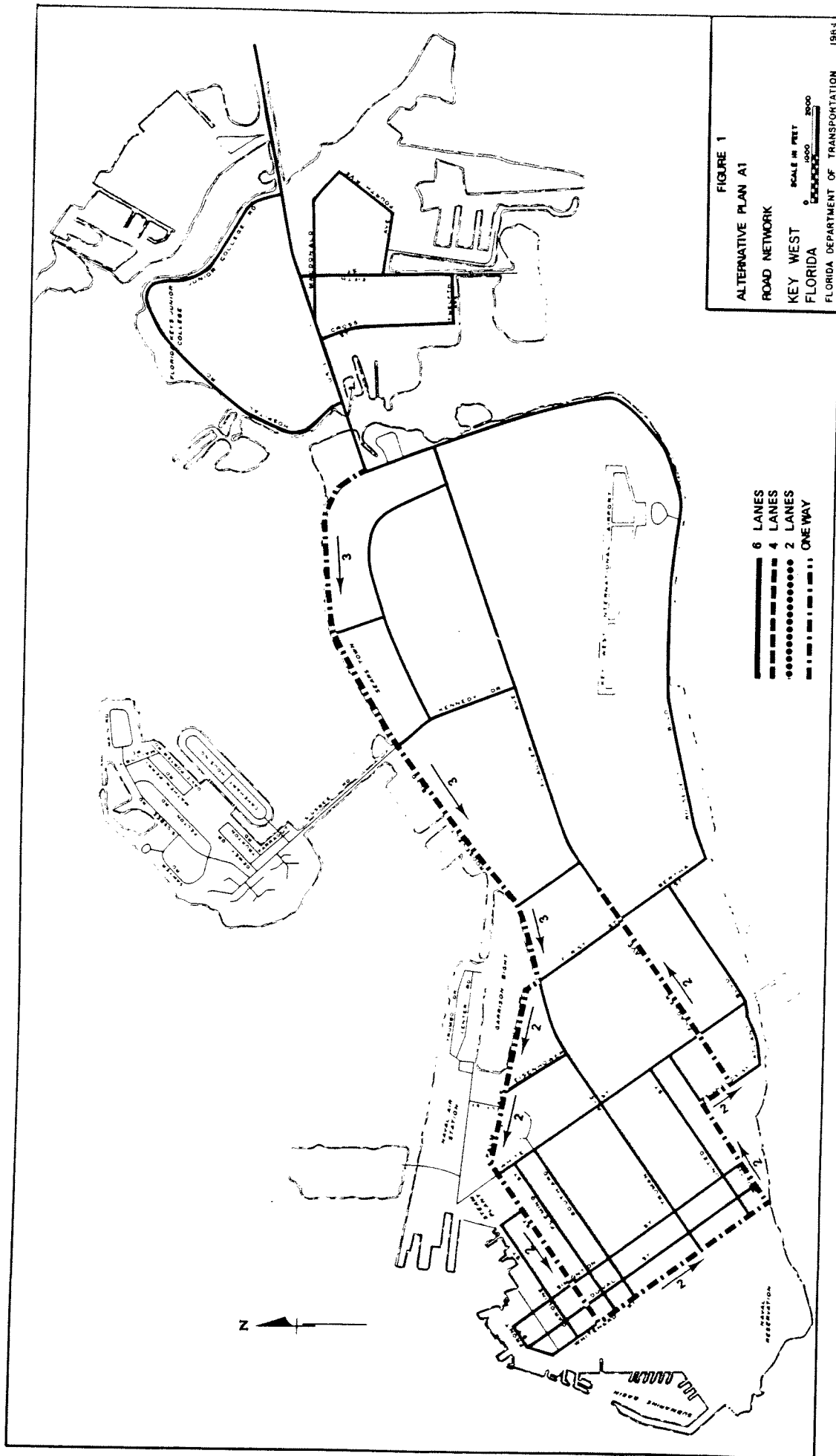
The improvements for the most part will be accommodated using the existing street surface. No additional right-of-way will need to be acquired, therefore reducing any physical damage to adjacent property due to construction.

### DESCRIPTION OF ALTERNATIVE PLAN

The major component of this plan is the conversion of existing two-way streets to one-way streets, creating a loop linking the eastern half of Key West with the Old Town area.

The one-way loop would start at the triangle area where US1 splits and becomes North and South Roosevelt Boulevard. The loop then follows North Roosevelt Boulevard west to Palm Avenue, where it would then continue along Palm Avenue to Eaton Street. At this point the loop would follow Eaton Street to Whitehead Street and continue south along Whitehead Street to South Street. From Whitehead Street, the one-way loop would then follow South Street to Reynolds Street where it would follow Reynolds Street the short distance to Flagler Avenue. The one-way loop would follow Flagler





Avenue and terminate at the intersection with First Street.

That portion of Flagler Avenue between First Street and Sixth Street which is two laned now, will be upgraded to four lanes and the continuation of the loop back to the start would utilize existing four lane facilities.

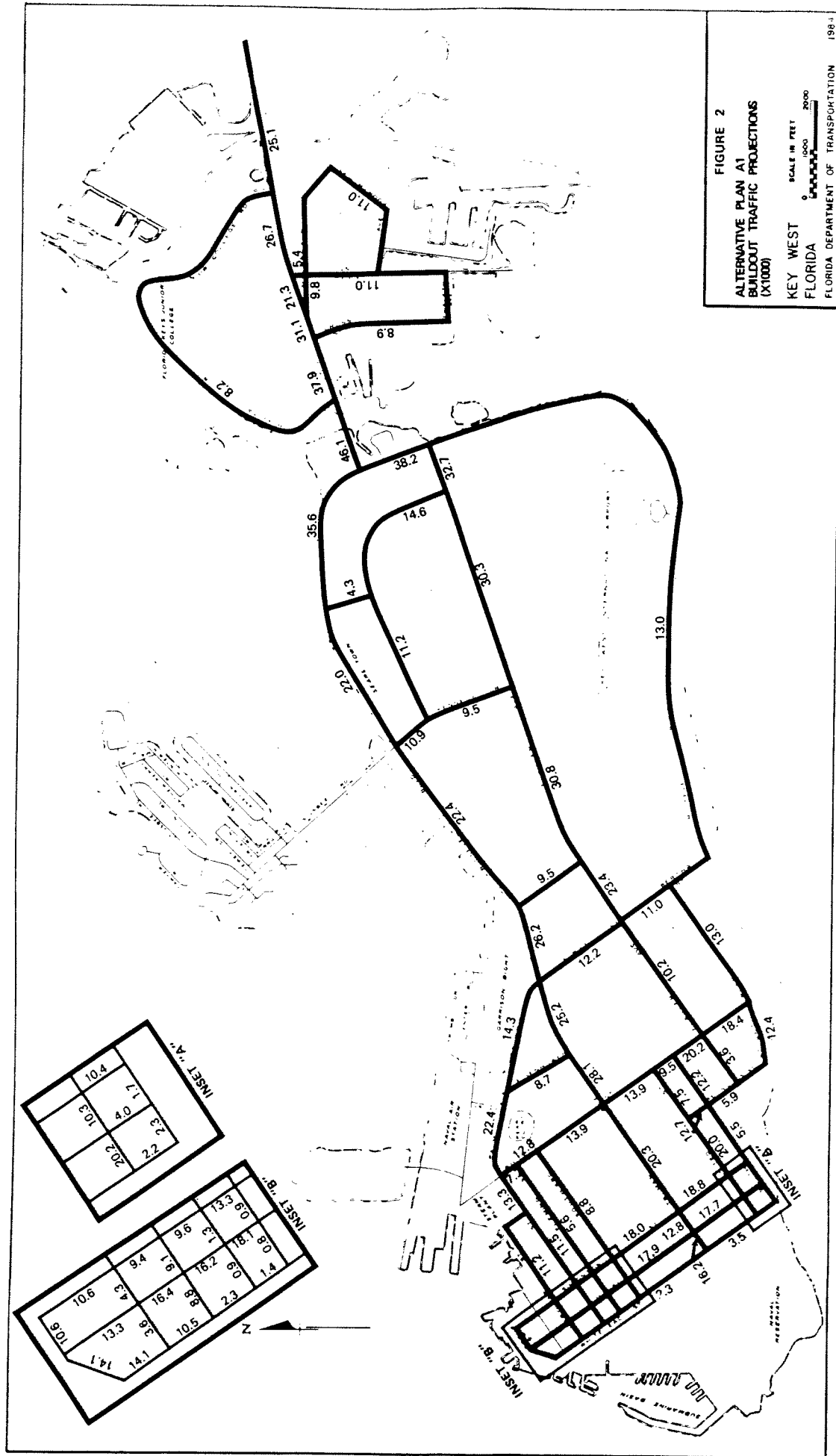
North Roosevelt Boulevard will provide a three lane cross section with the other one-way street conversions providing at least two lane cross sections.

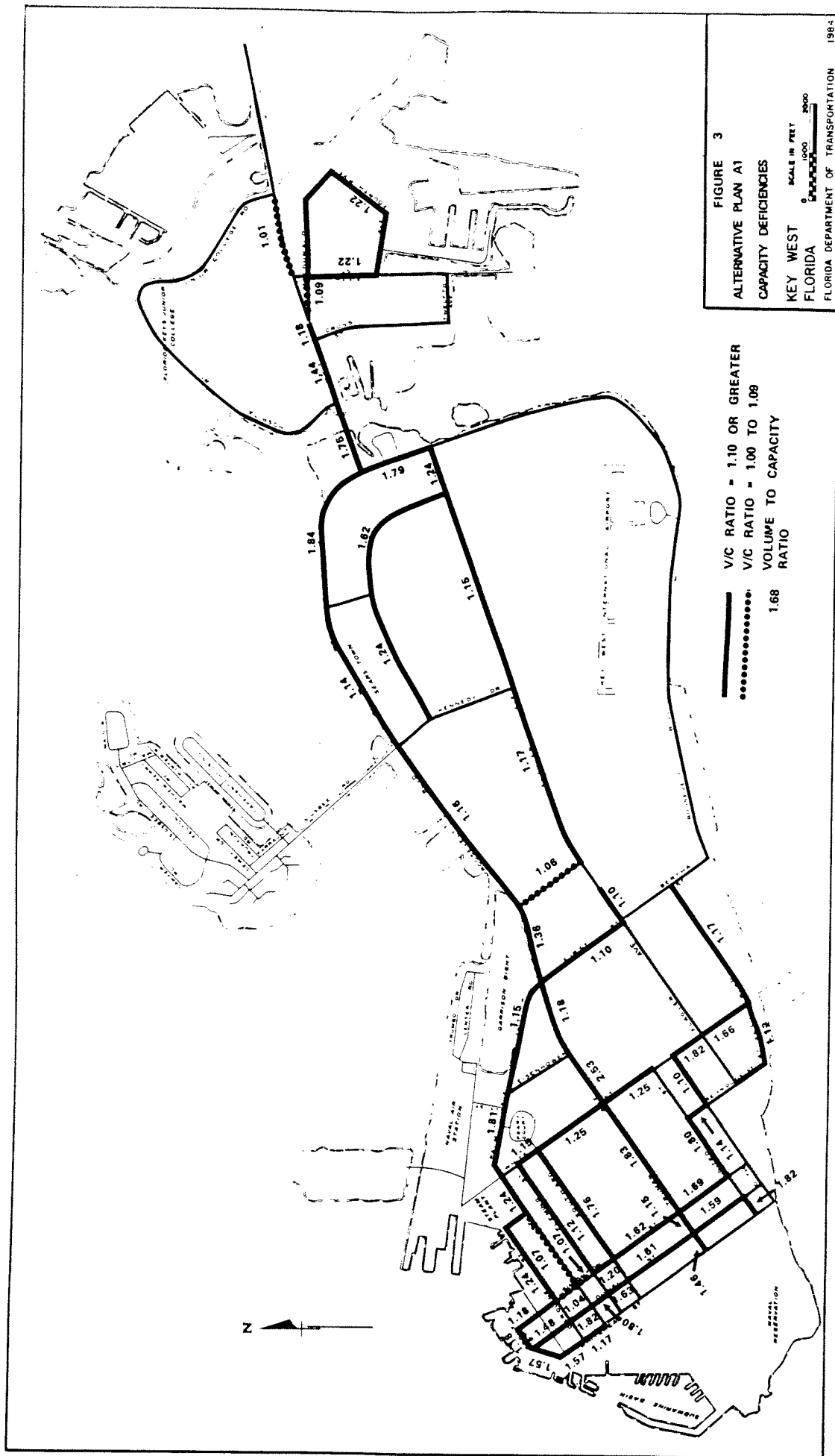
#### TRAFFIC ASSIGNMENT RESULTS

A traffic assignment projecting buildout traffic onto the Alternative Plan A1 network was created and the results are shown in Figure 2. Comparing these volumes with the design capacities establishes those areas which are deficient in capacity. Figure 3 outlines those roadways which have greater volume than capacity available.

Those roadways highlighted with a heavy solid line are roadways where the volume exceeds the capacity by 10% or greater. The dotted line indicates those sections of roadway where the volume exceeds the capacity by less than 10%. This same convention applies to subsequent capacity deficiency maps found in the remainder of this technical memorandum.

The Primary purpose of this alternative plan is to provide relief to the North Roosevelt Boulevard and Truman Avenue corridor leading into the Old Town area by altering the travel patterns of motorists in Key West. A secondary purpose was to encourage use of





an underutilized Flagler Avenue by linking Flagler Avenue to the one-way loop so that outbound traffic would have to pass over Flagler Avenue.

Although the assignment results show some lessening of traffic congestion in spot locations in Key West, congestion systemwide has generally worsened.

The general worsening of congestion is because the creation of one-way streets without provision for the reverse movement eliminates capacity in the reverse direction. Traffic moving contrary to the one-way direction must be accommodated on other facilities. For example, traffic moving into the Old Town area from Stock Island would have a choice of three facilities to use. These facilities, being North and South Roosevelt Boulevard and Flagler Avenue, have a total of six lanes in either direction. By creating a one-way street out of North Roosevelt Boulevard, two lanes in the reverse direction are eliminated. Traffic that is moving outbound (away from Old Town) will only have a choice of two facilities to utilize and therefore the use of only four lanes. The reduction of two lanes in the outbound direction is critical and causes the remaining streets in the corridor to break down.

This explains why Truman Avenue, Simonton Street, Duval Street and Southard Street shows increases in traffic congestion. These streets have had to pick up the additional traffic in the reverse direction.

This alternative has also caused an increase in traffic on many of the residential streets in Key West. Motorists, much like

fluids, will seek the path of least resistance. In this case, motorists will seek the shortest path. In some instances, this means the use of residential streets. These streets were designed for maximum access to property and were never intended to carry through trips.

Table 1 shows the major advantages and disadvantages of implementing Alternative Plan A1.

Table 1 Advantages and Disadvantages of Alternative  
Plan A1

---

ADVANTAGES

---

- (1) Can be implemented at a low cost. With the exception of four laning the short section of Flagler Avenue between First Street and the existing four lane section, the cost of this alternative is minimal.
- (2) Reduces the accident problem along North Roosevelt Boulevard by eliminating the opposing movement.

---

DISADVANTAGES

---

- (1) Impedes access to the businesses in the major commercial areas along North Roosevelt Boulevard.
  - (2) Reduces overall system capacity by eliminating capacity in the reverse direction.
  - (3) Encourages the use of congested arterials such as Duval Street, Truman Avenue and White Street.
  - (4) Encourages the use of residential streets to make the reverse movement.
  - (5) Does not provide relief to the US1 connector to Stock Island.
-

## ALTERNATIVE PLAN A2

Alternative Plan A2 is illustrated in Figure 4. This alternative was developed to encourage use of several underutilized facilities as a means of providing relief to North Roosevelt Boulevard and the bridge linking Stock Island with Key West. Any relief to North Roosevelt Boulevard should provide, to some degree, relief to an overburdened Truman Avenue.

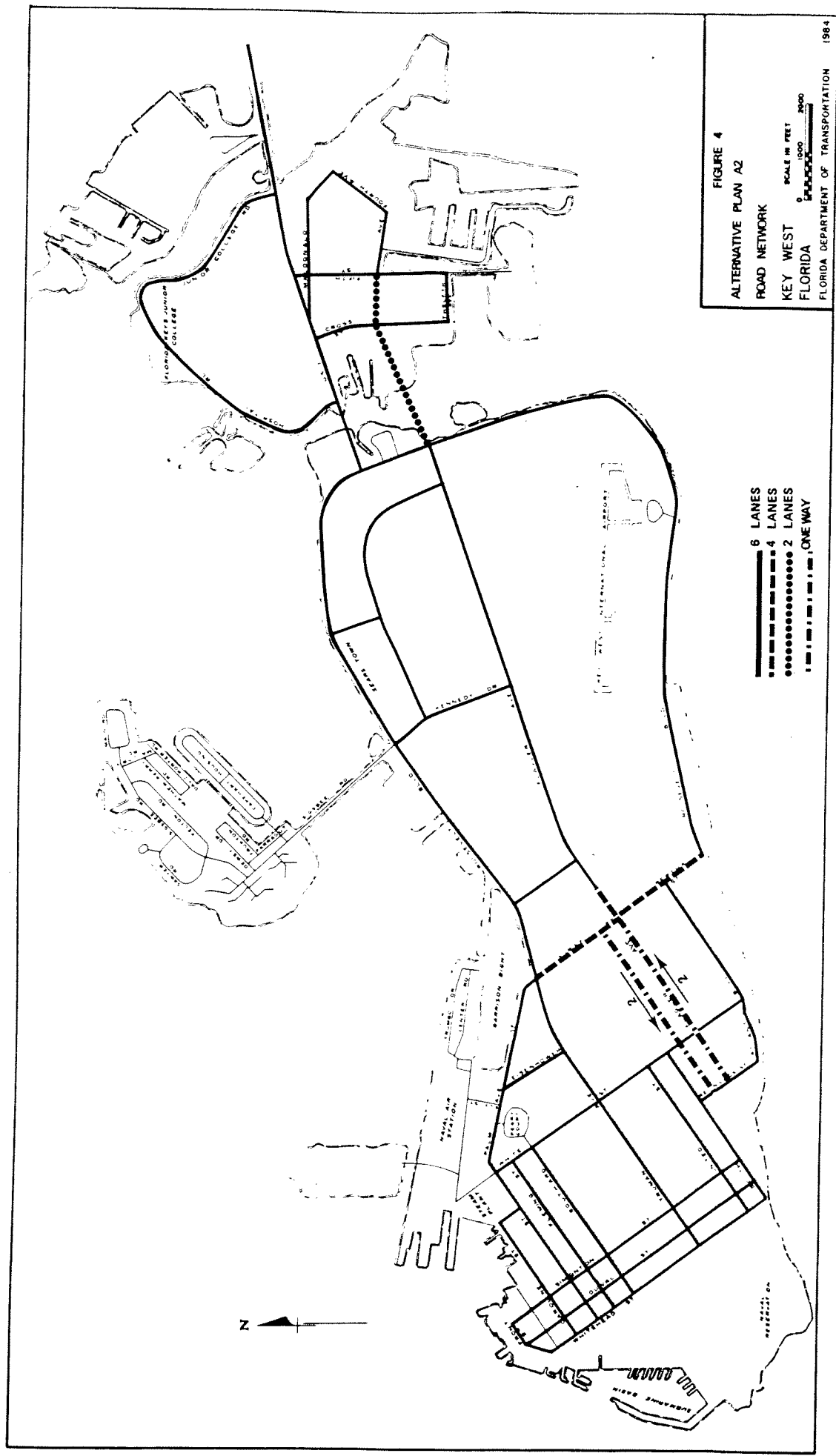
Improvements are to be made to both ends of Flagler Avenue in order to provide another direct route from Stock Island to the western half of Key West. Also, improvements are to be made to First/Bertha Street in an effort to make South Roosevelt Boulevard a more attractive route into town, thus providing additional relief to North Roosevelt Boulevard.

### DESCRIPTION OF ALTERNATIVE PLAN

The major component of this plan is a new bridge linking Stock Island with the main island of Key West. This bridge will be a two lane structure crossing Cow Key Channel connecting Flagler Avenue to Fifth Avenue on Stock Island. Fifth Avenue would have to be upgraded to an arterial in order to provide adequate access to the new bridge.

Another aspect of this plan calls for Flagler Avenue between Reynolds Street and First/Bertha Streets to become a one-way pair with Von Phister Street. Flagler Avenue would be two lanes eastbound and Von Phister would be two lanes westbound. This,





coupled with four laning the two lane portion of Flagler between First/Bertha and Sixth Streets, would provide a four lane corridor over the entire length of Flagler Avenue.

The last part of this alternative plan is the improvement of First/Bertha Street to a four lane cross section. This would provide a four lane access to and from South Roosevelt Blvd.

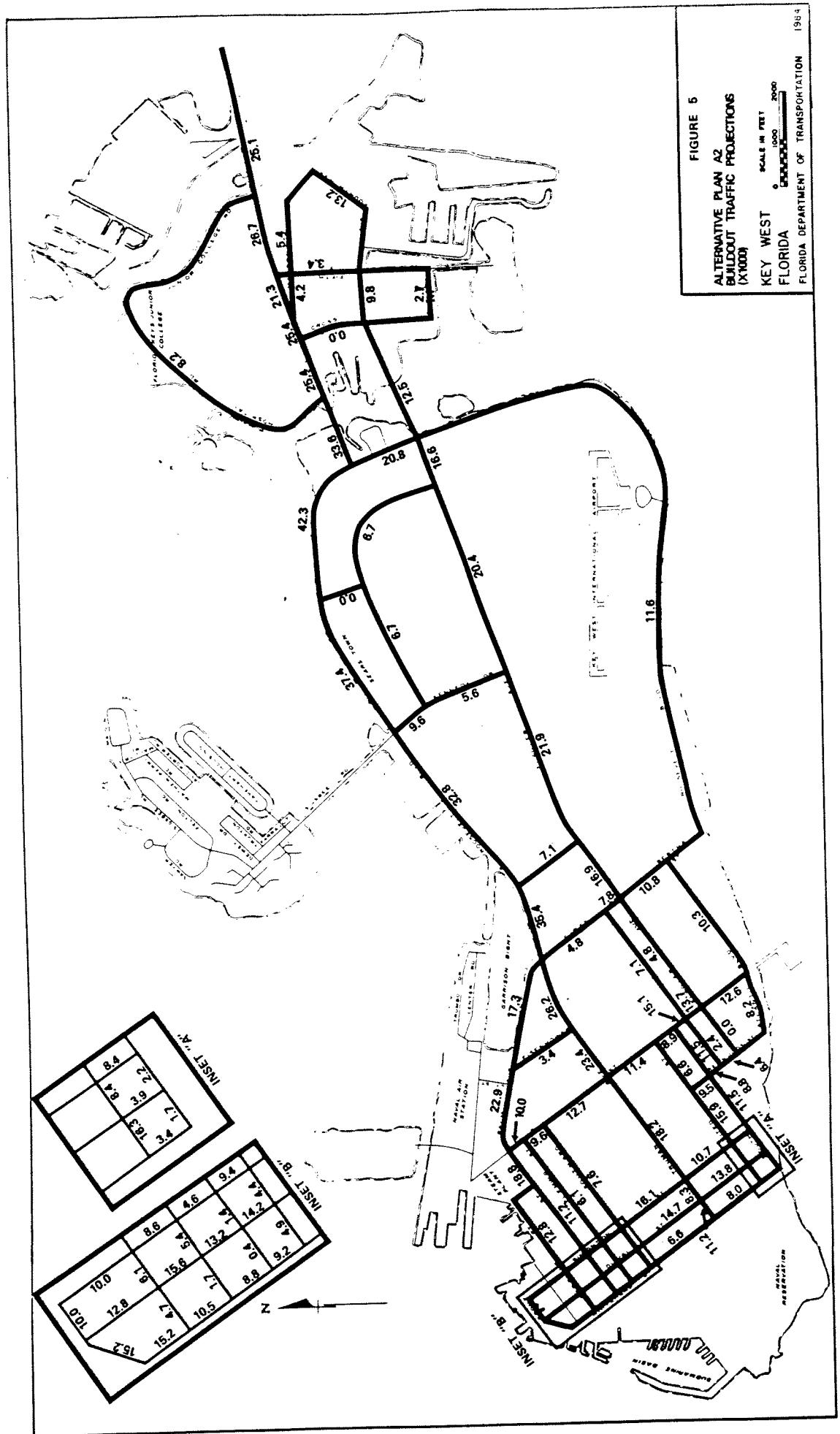
#### TRAFFIC ASSIGNMENT RESULTS

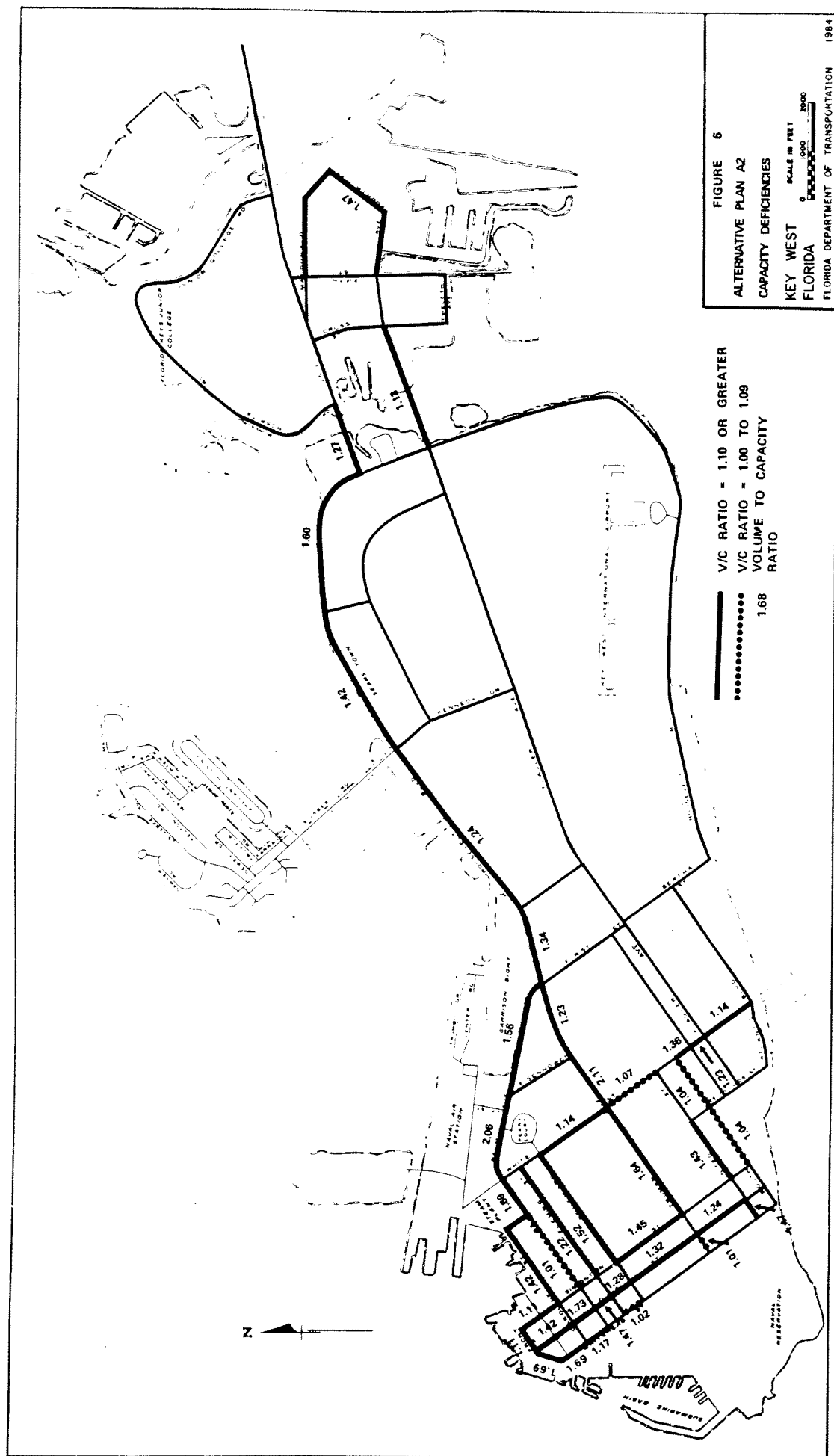
A traffic assignment projecting buildout traffic onto the Alternative Plan A2 network was created and the results are shown in Figure 5. Comparing these traffic volumes with the design capacities establishes those areas which are deficient in capacity. Figure 6 outlines those roadways which have greater volume than capacity available.

With the exception of the two lane portion of Flagler Avenue and the US1 bridge over Cow Key Channel, there has been basically no improvement in traffic congestion over the no build situation.

The shift in traffic from North Roosevelt Boulevard to Flagler Avenue did not materialize in this Alternative as had been expected. The new bridge provided relief to the existing bridge structure but its close proximity to the existing bridge all but negated its chances of altering traffic flow.

The new bridge provides an adequate alternate route to the Main Island from Stock Island but does not alter the traffic pattern of vehicles traveling along US1. North Roosevelt Boulevard provides access to an intense strip commercial business district





which has some services that are not found on any other part of Key West. This is a very strong attractor of trips and this attraction is enough to overcome the benefits of providing additional routes into town.

The new bridge may provide a bypass route for trips that are destined for places beyond this commercial strip. This way a reduction in traffic on North Roosevelt Boulevard might occur by separating through trips from trips that are destined for the commercial strip adjacent to North Roosevelt Boulevard. These through trips could then be routed across the new bridge and proceed into the Old Town area via Flagler Avenue. However, for maximum benefits, the new bridge must be connected directly to US1 for easy access by inbound traffic. Assignment results also show that any new bridge should be planned as a four laned structure.

Projected traffic does not warrant improvements to First/Bertha Streets beyond improving their alignments at their intersection with Flagler Avenue.

Table 2 shows the major advantages and disadvantages of implementing Alternative Plan A2.

Table 2 Advantages and Disadvantages of Alternative  
Plan A2

---

ADVANTAGES

---

- (1) Provides relief to the US1 connector to Stock Island.
- (2) Provides Relief to the two lane portion of Flagler Avenue between First/Bertha Street and the existing four lane section.

---

DISADVANTAGES

---

- (1) High cost due to the construction of a new bridge and four laning of First/Bertha Streets
  - (2) Proposed Flagler Avenue bridge does not link to US1.
  - (3) Increase in traffic on the residential street of Von Phister.
  - (4) May require the taking of some property along Von Phister Street due to limited amount of right-of-way available.
  - (5) The termination of the one-way pair at First Street does not provide for a smooth transition into Flagler Avenue.
-

## ALTERNATIVE PLAN A3

Alternative Plan A3 is illustrated in Figure 7. This plan calls for improvements to be made to the North Roosevelt Boulevard and Palm Avenue corridor leading into the Old Town area. These improvements are geared to accommodating projected traffic volumes on overloaded facilities by increasing capacity as opposed to encouraging the use of underutilized facilities.

### DESCRIPTION OF ALTERNATIVE PLAN

Alternative Plan A3 calls for the widening of North Roosevelt Boulevard to six lanes from the point where US1 splits to become North and South Roosevelt Boulevard to Palm Avenue.

Palm Avenue would be improved to four lanes and its terminus at White Street redesigned so that Palm Avenue would feed into a new one-way pair consisting of Caroline and Eaton Streets.

Caroline Street would be extended eastward to connect with an extension of Palm Avenue. This would create a smooth transition from Palm Avenue to Caroline Street.

Caroline Street would be the westbound leg of the one-way pair and consist of two traveled lanes. Eaton Street would then become the eastbound leg and would also consist of two traveled lanes.

### TRAFFIC ASSIGNMENT RESULTS

A traffic assignment projecting buildout traffic onto the

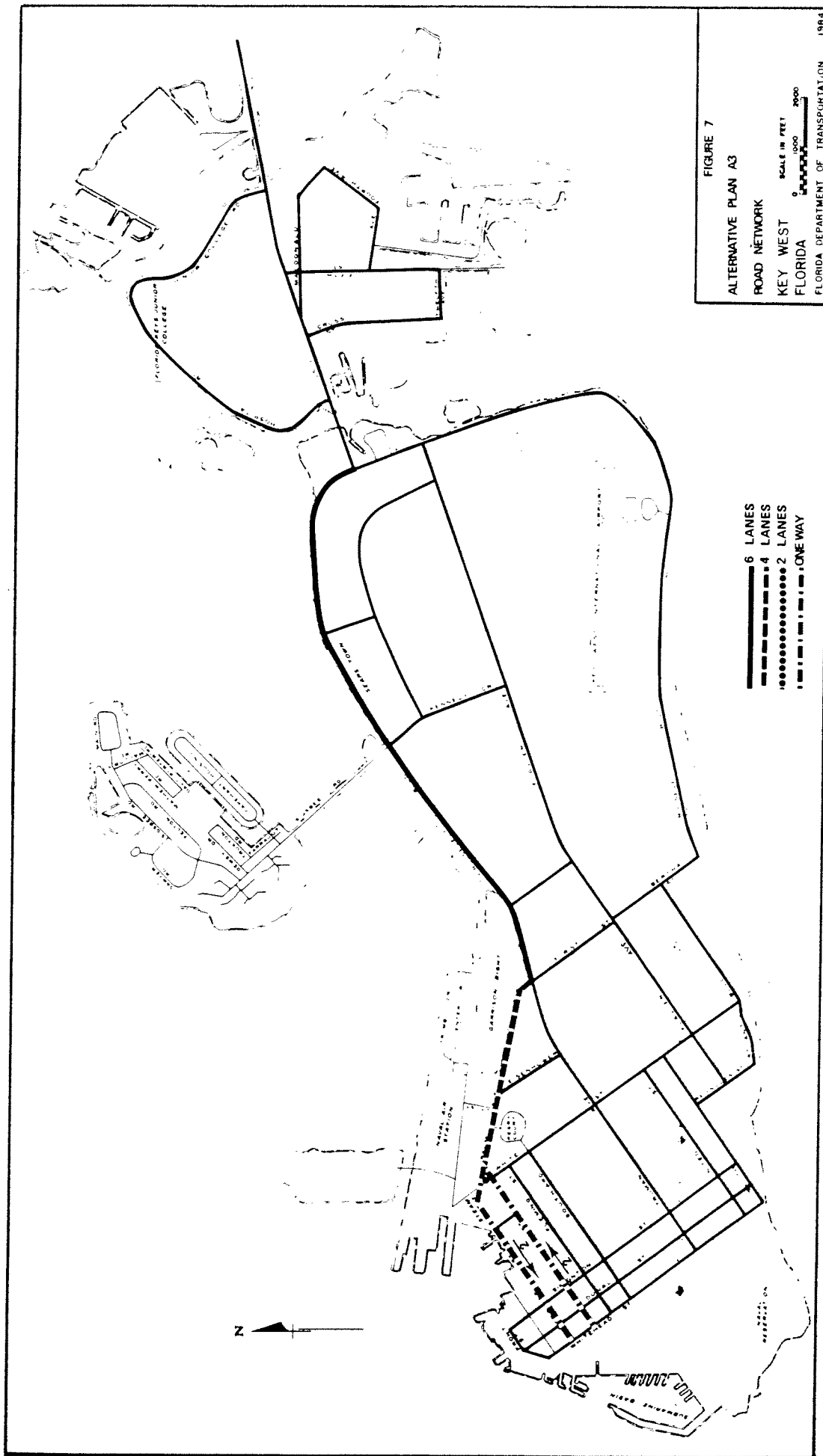


FIGURE 7

ALTERNATIVE PLAN A3

ROAD NETWORK

KEY WEST

FLORIDA

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- 6 LANES
- 4 LANES
- 2 LANES
- ONE WAY



Alternative Plan A3 network was created and the results are shown in Figure 8. Comparing these traffic volumes with the design capacities yields those areas which are deficient in capacity. Figure 9 outlines those roadways which have greater volume than capacity available.

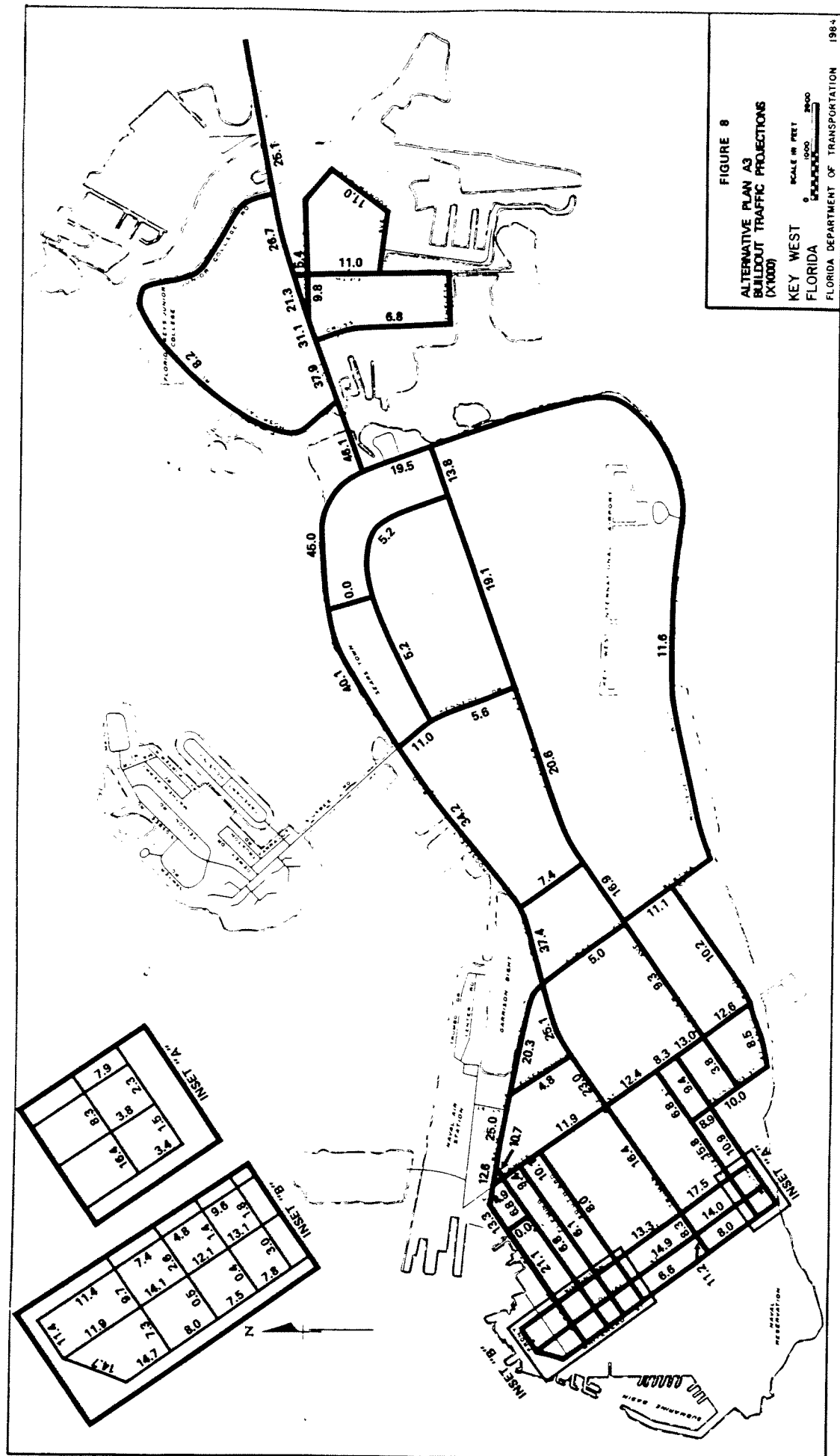
The intended purpose of this plan is to provide relief to North Roosevelt Boulevard and Palm Avenue corridor leading into the Old Town area by improving capacity through the addition of travel lanes.

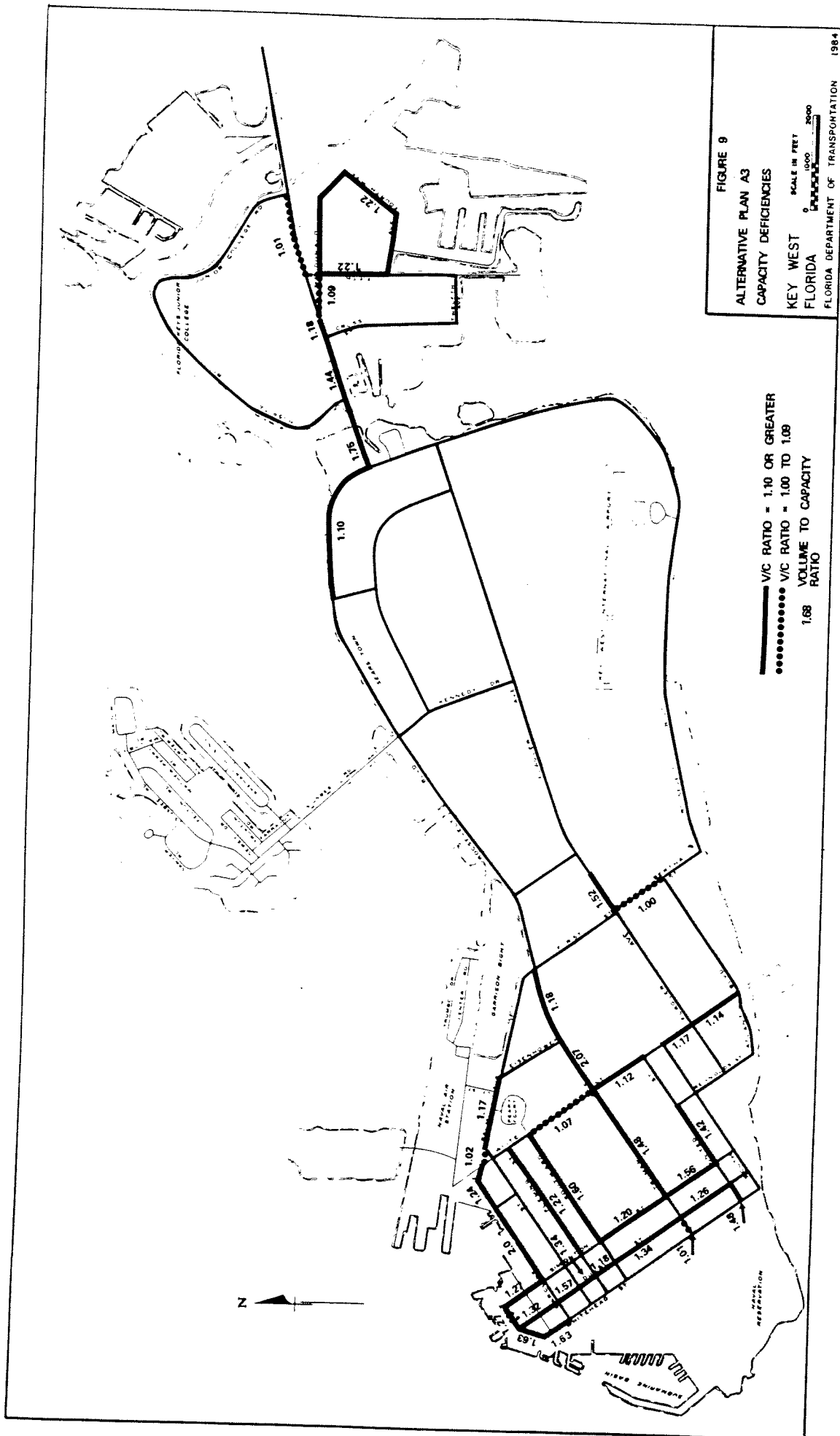
The increase in capacity on North Roosevelt Boulevard from four lanes to six lanes has reduced the congestion along this section considerably. Only a small section between the triangle area and 17th Street remains over capacity. However, the improvement has reduced congestion along this remaining section by over 50% and although it is still over capacity, the congestion has been reduced to tolerable levels.

Palm Avenue has experienced a reduction in congestion because of the increase in capacity, although the reduction in congestion was not as great as had been expected. This is because the improvements along Palm Avenue and the Caroline and Eaton Street one-way pair has caused approximately 2,000 vehicles to divert to this route.

Truman Avenue has experienced some reduction in traffic but this reduction does not begin to reduce congestion. It appears that the additional 2,000 vehicles diverted to the Palm Avenue improvement has come off of Truman Avenue.

As a side effect, the improvements of this alternative plan





have relieved congestion along Duval, Simonton and White Streets to varying degrees.

Table 3 shows the major advantages and disadvantages of implementing Alternative Plan A3.

Table 3 Advantages and Disadvantages of Alternative  
Plan A3

---

ADVANTAGES

---

- (1) Provides an improved route to the Old Town area for heavy trucks and other commercial vehicles.
- (2) Does not impact the residential areas of Key West.
- (3) Provides better access to the commercial areas adjacent to North Roosevelt Boulevard.
- (4) Relieves traffic along Truman Avenue to some degree.

---

DISADVANTAGES

---

- (1) High cost due to the construction of additional lanes along North Roosevelt Boulevard and Palm Avenue.
  - (2) High cost of relocating transformers, fuel tanks and transmission lines.
  - (3) Would require the purchase of private property.
  - (4) Would have to relocate low income housing.
  - (5) Does not address the problems of congestion on the US1 connector to Stock Island.
-

## ALTERNATIVE PLAN A4

Alternative Plan A4 is illustrated in Figure 10. This plan calls for the creation of new one-way pairs in the Old Town area of Key West. This plan was developed in an attempt to provide relief to those roads in the Old Town area which are in the most distress. This area of town provides little or no opportunity for expansion of the road network. Providing one-way pairs is a means of providing some additional capacity while requiring little or no additional right-of-way.

One-way streets, for the most part, can be created using the existing street surface.

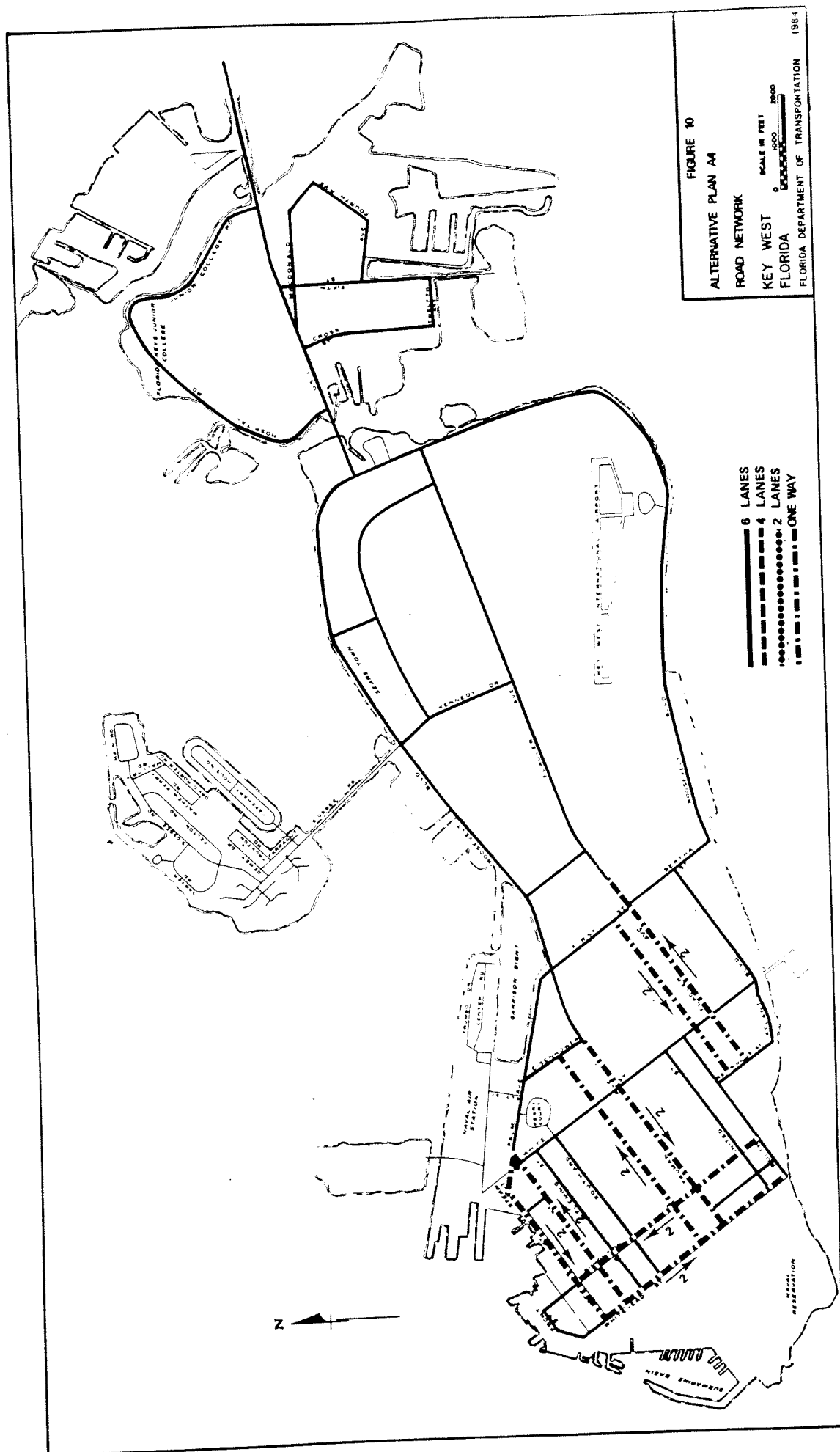
### DESCRIPTION OF ALTERNATIVE PLAN

This plan calls for the creation of four new one-way pairs within the Old Town area of Key West.

The first one-way pair consists of pairing Flagler with Von Phister. This pair is identical to that described in Alternative Plan A2.

The second one-way pair consists of pairing Truman Avenue with Olivia Street. This pair would run from Whitehead Street east to Eisenhower Street. Truman would provide two westbound lanes and Olivia Street would provide two eastbound lanes.

The third one-way pair consists of pairing Whitehead Street with Simonton Street. This Pair would run from Caroline Street to South Street. Whitehead Street would provide two lanes southbound



and Simonton Street would provide two lanes northbound.

The last one-way pair consists of pairing Caroline Street with Eaton Street. This pair is identical to that described in Alternative Plan A3.

In addition to the one-way street pairings, Duval Street will be closed to traffic from Truman Avenue to Front Street. Also the two lane portion of Flagler Avenue from First/Bertha Street and the existing four lane section will be improved to four lanes.

#### TRAFFIC ASSIGNMENT RESULTS

A traffic assignment projecting buildout traffic onto the Alternative Plan A4 network was created and the results are shown in Figure 11. Comparing these traffic volumes with the design capacities establishes those areas which are deficient in capacity. Figure 12 outlines those roadways which have greater volume than capacity available.

The intended purpose of this alternative is to provide relief to the overburdened street network within the Old Town area of Key West, by providing more efficient one-way pairs.

The assignment results show complete relief of congestion along the two lane section of Flagler Avenue between First/Bertha Street the existing four lane section and major relief to Truman Avenue. The closing of Duval Street has reduced the capacity within the Whitehead, Duval and Simonton Street corridor by approximately 10,000 vehicles. This has worsened the situation on Simonton Street. The additional capacity received by the Caroline



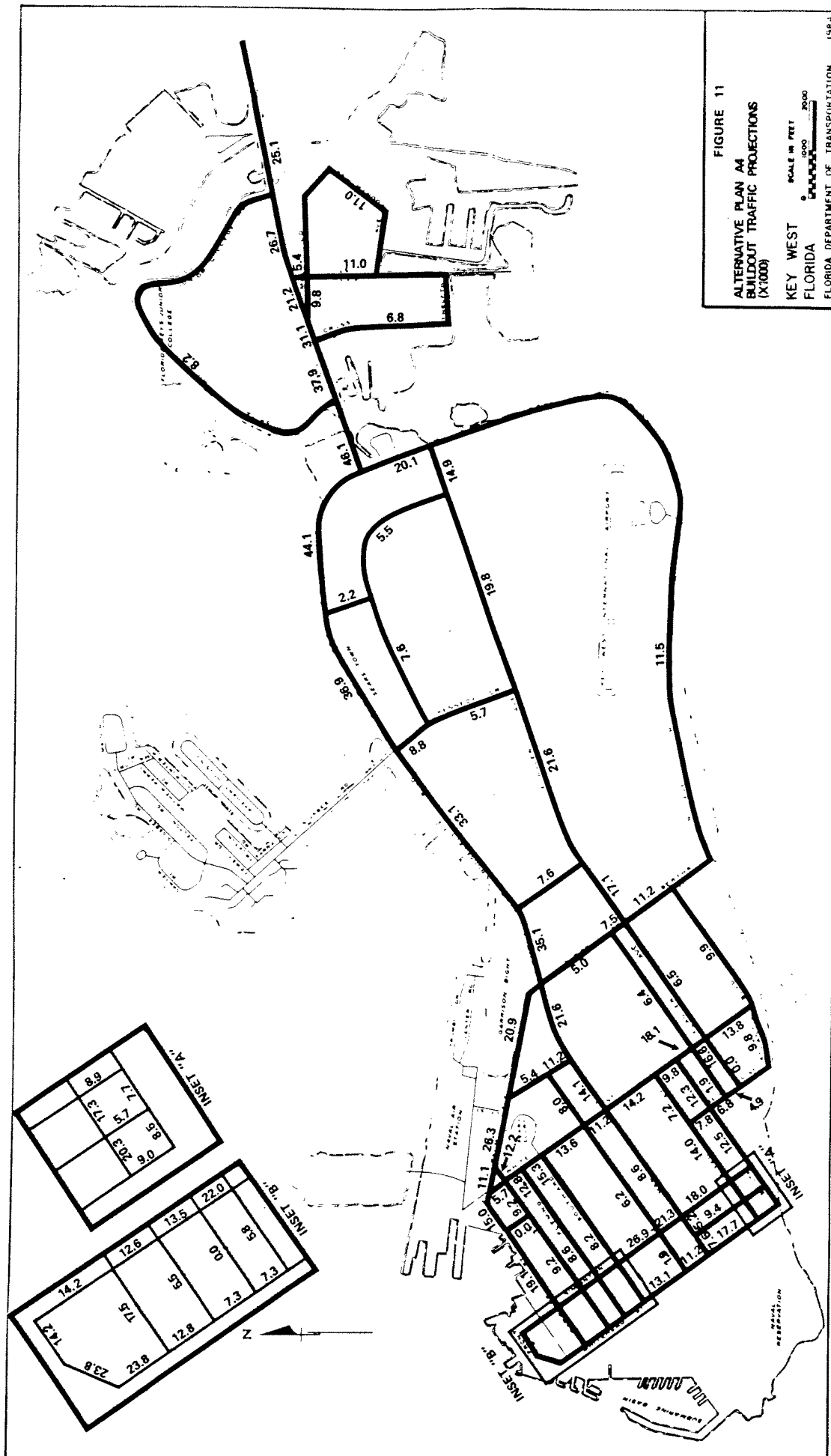
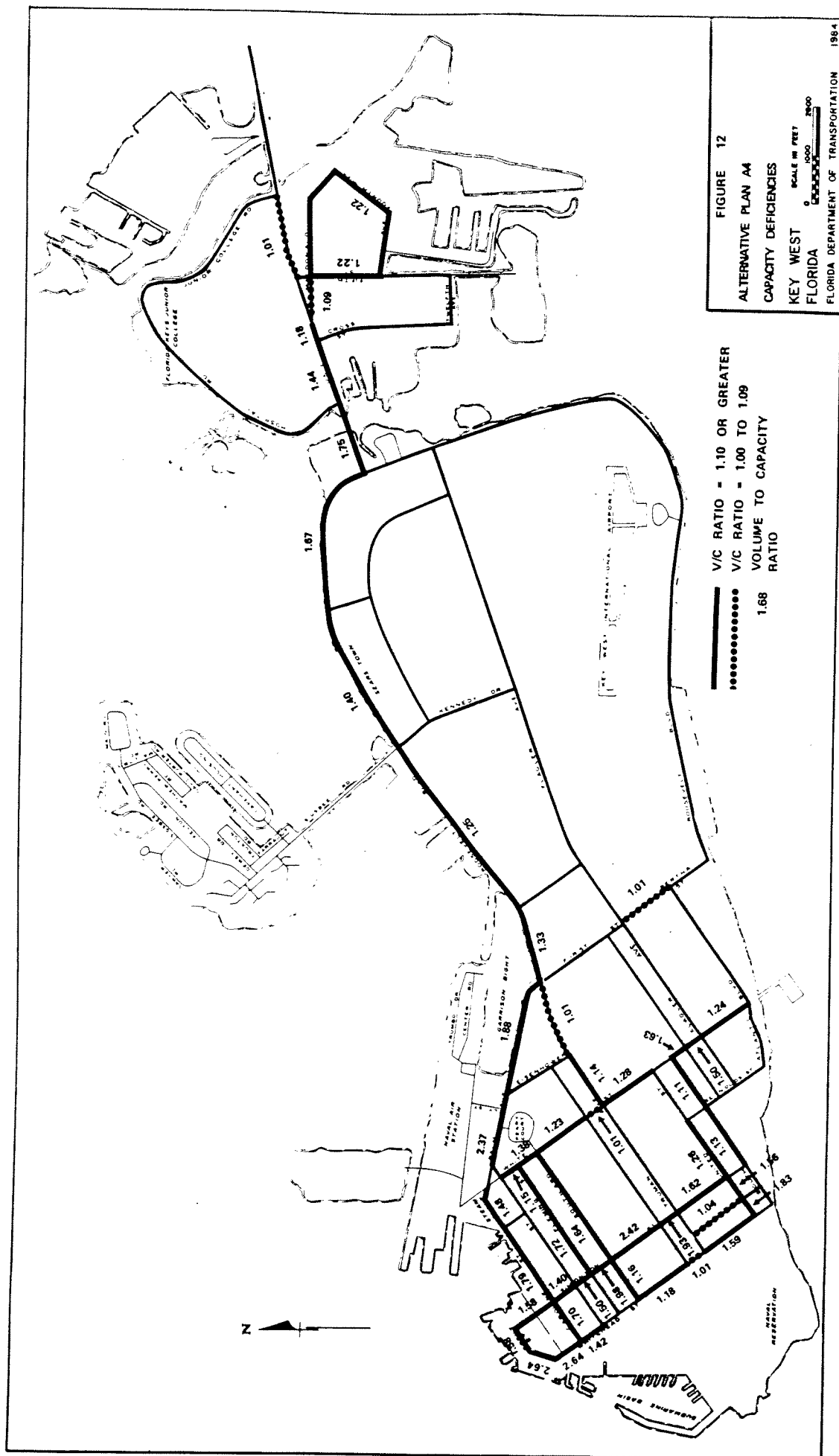


FIGURE 11

ALTERNATIVE PLAN A4  
BUILDOUT TRAFFIC PROJECTIONS  
(X1000)

KEY WEST  
FLORIDA  
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and Eaton Street one-way pair was simply not enough to reduce congestion.

The one-way plan did not address the eastern half of the island and as a consequence there were no improvements to the congestion noticed there.

Table 4 shows the major advantages and disadvantages of implementing Alternative Plan A4.

Table 4 Advantages and Disadvantages of Alternative  
Plan A4

---

ADVANTAGES

---

- (1) Provides Relief to the Truman Avenue congestion problem.
- (2) Provides relief to the two lane section of Flagler Avenue between First/Bertha Street and the existing four lane section.

---

DISADVANTAGES

---

- (1) High cost due to extending Caroline Street and Palm Avenue.
  - (2) High cost of relocating transformers and fuel tanks.
  - (3) Would require the purchase of private property to extend Caroline Street and Palm Avenue.
  - (4) Would have to relocate low income housing to extend Caroline Street and Palm Avenue.
  - (5) Requires the removal of parking and the purchase of some additional ROW on Olivia Street.
  - (6) Requires the removal of parking and the purchase of some additional ROW on Von Phister Street.
  - (7) Will increase traffic on the residential streets of Von Phister and Olivia.
  - (8) Does not provide for a smooth transition at the end points of the Flagler Avenue/Von Phister and Truman Avenue/Olivia Street one-way pairs.
  - (9) Provides no relief to congestion on the eastern half of the island.
  - (10) Reduces circulation to commercial and governmental offices.
  - (11) Reduces capacity in the Duval Street corridor.
-

## ALTERNATIVE PLAN A5

Alternative Plan A5 is illustrated in Figure 13. This plan calls for improvements to transit service in an attempt to reduce congestion by reducing the demand on the street system.

### DESCRIPTION OF ALTERNATIVE

The major component of this alternative is the improvement of transit by increasing the availability of service. This is accomplished primarily by decreasing headways and increasing the coverage area. The transit schemes shown in Figure 13 are only intended to be an example of the type of improvements that are feasible. In reality, any scheme which increases service and coverage will improve ridership.

In order to maximize ridership, a comprehensive marketing campaign needs to be included as part of this alternative. A marketing campaign would improve the public awareness of the benefits of transit. In order for transit to work, the public must have the impression that the bus is the quickest and easiest way to travel around town.

Additional strategies, such as remote parking, improved signing, vehicle restrictions and the promotion of bicycling can be included to expand Alternative Plan A5 into a comprehensive demand reducing alternative.

In addition to transit improvements, this alternative calls for the closure of Duval Street from Front Street to Truman

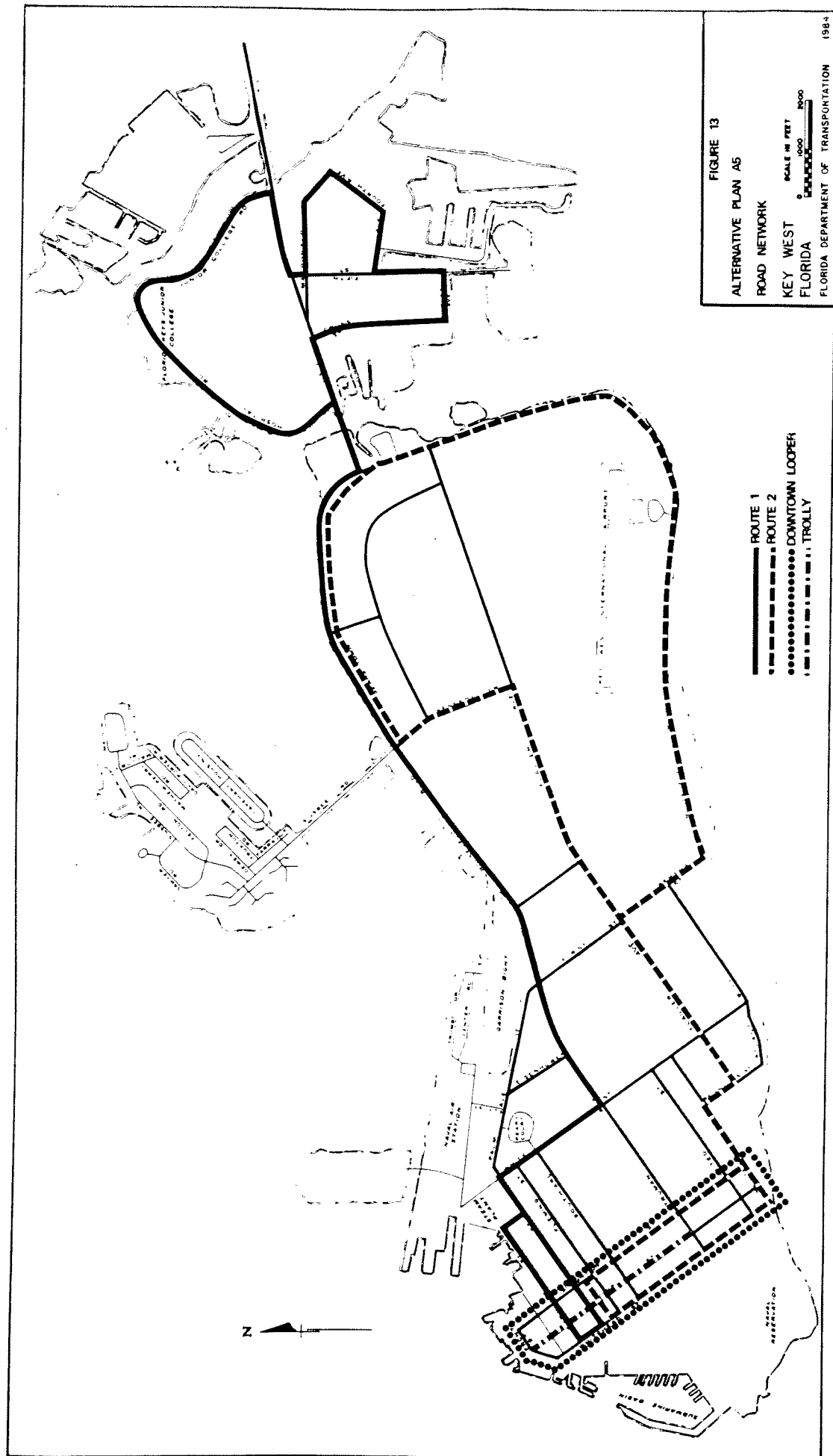


FIGURE 13

ALTERNATIVE PLAN AS

ROAD NETWORK

KEY WEST

FLORIDA

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Avenue.

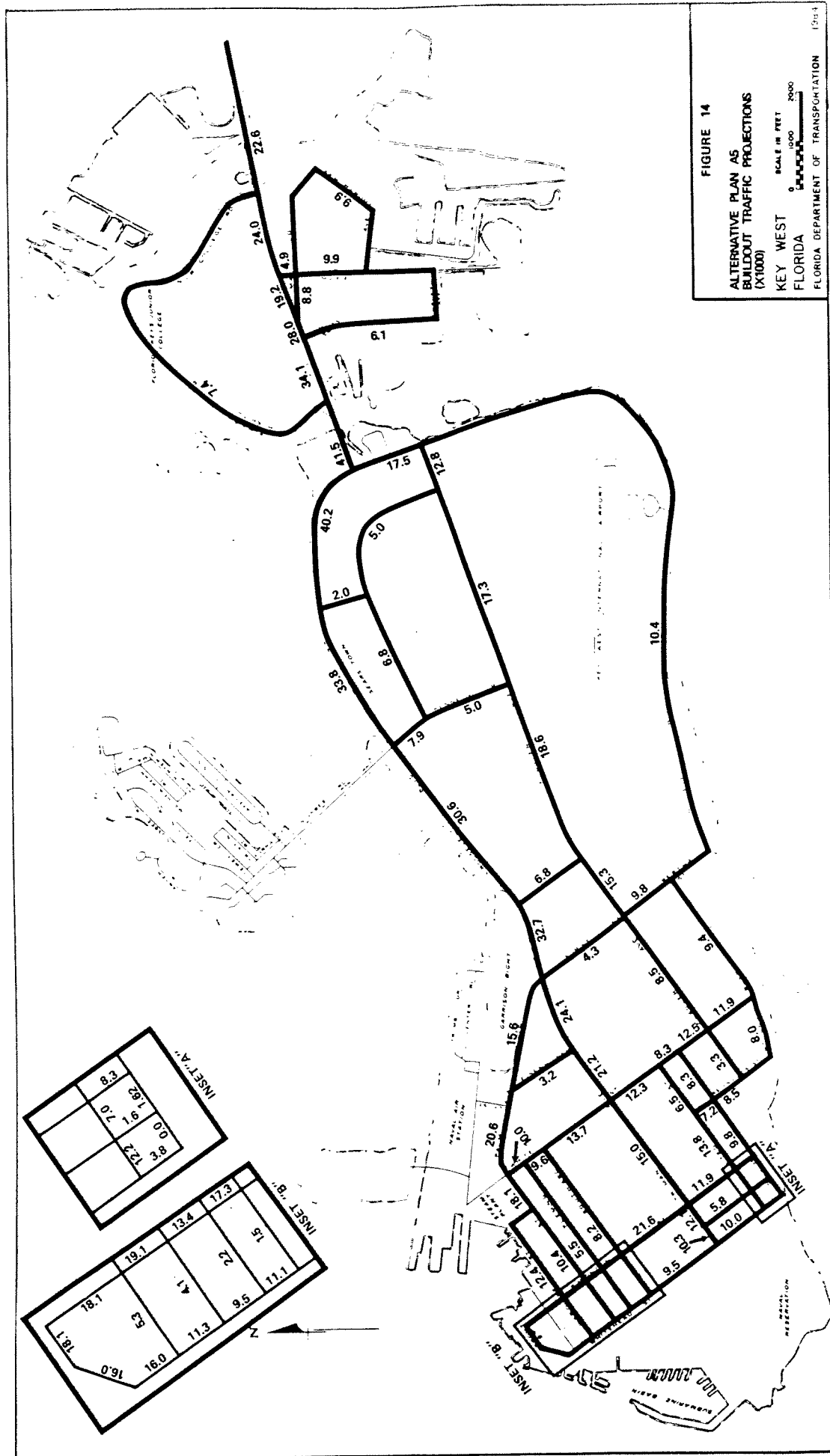
## TRAFFIC ASSIGNMENT RESULTS

It is difficult to model what effect demand reducing improvements such as improved bus service, remote parking, bicycling, etc. have on the street system without employing complex modeling techniques. For the purposes of this study, it will be assumed that the range of possible demand reducing improvements will only decrease the total number of trips by 10%.

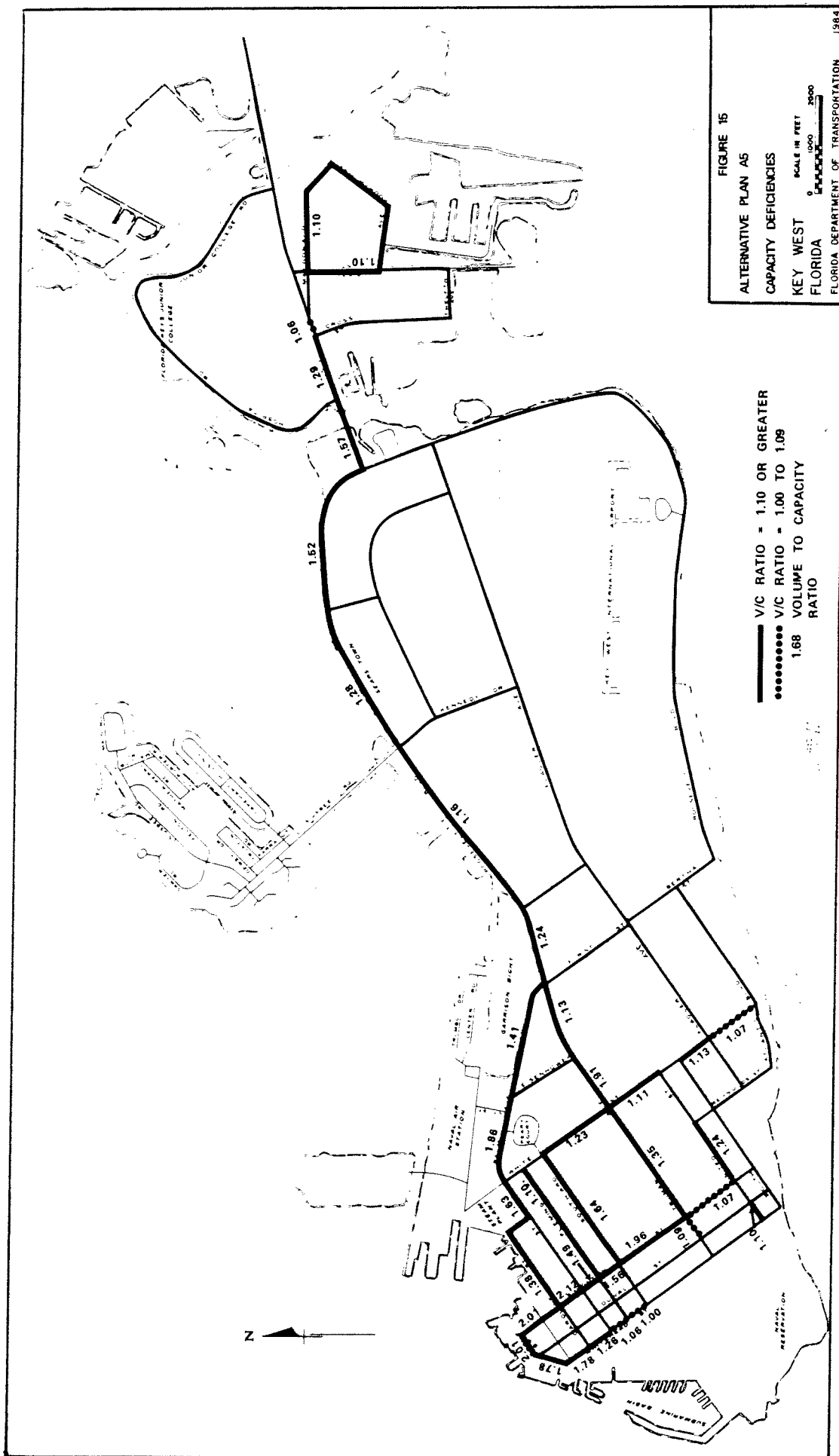
Miami has the most comprehensive transit system in the State and can only attract from 5 to 8 percent of the county's total daily trips. Based on Miami's ridership figures, it would be unreasonable to expect that Key West would be able to get more than 10% of the total daily trips to divert to modes of transportation other than a car.

Figure 14 shows the results of an assignment projecting transit reduced traffic onto the Alternative Plan A5 network. Comparing these traffic volumes with the design capacity establishes those areas which are deficient in capacity. Figure 15 outlines those roadways which have greater volume than capacity available.

The assignment results show a lessening of traffic volume system wide but not enough to cause any major reduction in congestion. The closure of Duval Street has increased congestion along the Whitehead, Duval and Simonton Street corridor because of a total reduction in capacity. As stated earlier, the closure of







Duval Street reduces the capacity in this corridor by approximately 10,000 vehicles.

Table 5 shows the advantages and disadvantages of implementing Alternative Plan A5.

Table 5 Advantages and disadvantages of Alternative  
Plan A5

---

ADVANTAGES

---

- (1) Minimizes construction costs.
- (2) Uses the assets that are available.
- (3) Reduces residential disruption.
- (4) Reduces the demand on the street system.

---

DISADVANTAGES

---

- (1) Increases North/South traffic congestion in the Old Town area due to the elimination of North/South capacity with the closure of Duval Street.
  - (2) Reduces circulation to the commercial establishments and Governmental Offices in the Old Town area.
  - (3) Operating and Maintenance will increase for transit.
  - (4) Does not provide complete relief to any of the extremely congested areas.
-

## CONCLUSION

No alternative plan modeled provided complete relief to the congestion problems that will be experienced at buildout. It is obvious that Key West is limited in the number of capacity increasing projects it can employ.

The next step in the process to develop a traffic circulation plan for Key West is to combine the best features of the five alternative plans into two additional alternatives which will be looked at in depth. Those projects which would cause an adverse impact to the citizens or to the tropical atmosphere of Key West should be eliminated from consideration. Only those projects which could be supported by the citizens of Key West should be seriously considered.

White Street appeared on every alternative plan as capacity deficient. Future iterations of the alternatives should pay attention to this problem area.